We claim:

1. A system for measuring a change in thickness of a layer of material disposed on a wafer while said layer is polished, said system comprising:

a polishing pad suitable for polishing the layer;

a sensor assembly disposed in the polishing pad, said sensor assembly comprising:

a light source capable of emitting a known wavelength of light;

a light detector capable of detecting the intensity of light incident on the light detector; and

an optical puck, wherein the light source and the light detector are contained within the optical puck and wherein the optical puck is transparent to a predetermined wavelength of light;

a means for conveying power to the light source and to the light detector, said means for conveying power operably connected to the sensor assembly; and

a processor operably connected to the light detector, wherein during polishing the intensity of light incident on the light detector varies sinusoidally over the time of polishing, wherein the processor is programmed to measure a sinusoidal curve indicative of the intensity of detected light over time and wherein the processor is further programmed to measure the wavelength of the sinusoidal curve.

2. The system of claim 1 further comprising a control system operably connected to the processor and to a means for polishing the wafer, said control system capable of controlling the rate of polishing when the processor measures a predetermined wavelength of the sinusoidal curve.

3. The system of claim 1 wherein the optical puck is characterized by an outer surface facing outwardly from the pad and the polishing pad is characterized by an outer surface adapted to face the wafer, and wherein the outer surface of the optical puck is substantially flush with the outer surface of the polishing pad.

4. A system for measuring a change in thickness of a layer of material disposed on a wafer while said layer is polished, said system comprising:

a polishing pad suitable for polishing the layer;

a sensor assembly disposed in the polishing pad, said sensor assembly comprising:

a light source capable of emitting a known wavelength of light;

a light detector capable of measuring the intensity of light incident on the detector and a means for converting the intensity of light into an electrical signal corresponding to the intensity of the light incident on the detector; and

an optical puck, wherein the light source and the light detector are contained within the optical puck and wherein the optical puck is transparent to a predetermined wavelength of light;

a means for conveying power to the light source and to the light detector, said means for conveying power operably connected to the sensor assembly;

a means for conveying the electrical signal to a processor, said means for conveying the electrical signal operably connected to the sensor assembly;

wherein the processor is programmed to correlate a change in the electrical signal to a change in the thickness of the layer.

5. The system of claim 4 further comprising a control system operably connected to the processor and to a means for polishing the wafer, said control system capable of modifying the rate of polishing in response to the change in the thickness of the layer.

6. The system of claim 4 wherein the optical puck is characterized by an outer surface facing outwardly from the pad and the polishing pad is characterized by an outer surface adapted to face the wafer, and wherein the outer surface of the optical puck is substantially flush with the outer surface of the polishing pad.

7. A method of measuring a change in the thickness of a layer disposed on a first wafer while the layer is being polished by a polishing process, said method comprising the steps of:

measuring a first thickness of the layer;

directing light of a known wavelength towards the surface of the layer, said light emitted by a light source;

thereafter polishing the layer with the polishing process while measuring the intensity of the light reflected from

the layer with a light detector, wherein polishing continues until a predetermined wavelength of a first sinusoidal curve is measured, said first sinusoidal curve representing the intensity of the reflected light over the time of polishing;

thereafter measuring a second thickness of the wafer; and

combining the first thickness and second thickness to calculate a first change in the thickness of the layer.

8. The method of claim 7 comprising the further step of calibrating the sinusoidal curve by correlating the first change in thickness of the layer to the predetermined wavelength of the first sinusoidal curve.

9. The method of claim 8 wherein a fraction of the predetermined wavelength of the first sinusoidal curve corresponds to a total change in the thickness of the layer equal to said fraction times the first change in the thickness of the layer.

10. The method of claim 8 comprising the further steps of:

providing a second wafer, said second wafer having a structure similar to that of the first wafer, said second wafer characterized by a layer of material disposed on the second wafer;

polishing the layer of the second wafer using the polishing process;

directing the light towards the surface of the layer of the second wafer;

measuring the intensity of the light reflected from the layer of the second wafer as the layer of the second wafer is polished, wherein a change in the intensity of the reflected light over the time of polishing the second wafer is portrayed as a second sinusoidal curve, wherein said second sinusoidal curve is about equal to the first sinusoidal curve;

wherein a change in thickness of the layer of the second wafer is correlated to the predetermined change in wavelength of the first sinusoidal curve.

11. The method of claim 8 comprising the further steps of:

providing a second wafer, said second wafer having a similar structure to that of the first wafer, said second wafer characterized by a layer of material disposed on the second wafer;

polishing the layer of the second wafer using the polishing process;

directing the light of known wavelength onto the surface of the layer of the second wafer;

measuring the intensity of the light reflected from the layer of the second wafer as the layer of the second wafer is polished, wherein the change in the intensity of the reflected light from the second wafer over the time of polishing is portrayed as a second sinusoidal curve, wherein the second sinusoidal curve is about equal to the first sinusoidal curve; and

calculating a change in the thickness of the layer of the second wafer by counting the number of predetermined

wavelengths measured on the second sinusoidal curve during polishing and multiplying the number of predetermined wavelengths measured times the first change in thickness.

12. The method of claim 7 wherein the light source and the light detector are provided within an optical puck disposed within the polishing pad.

13. The method of claim 8 wherein the light source and the light detector are provided within an optical puck disposed within the polishing pad.

14. The method of claim 9 wherein the light source and the light detector are provided within an optical puck disposed within the polishing pad.

15. The method of claim 10 wherein the light source and the light detector are provided within an optical puck disposed within the polishing pad.

16. The method of claim 11 wherein the light source and the light detector are provided within an optical puck disposed within the polishing pad.